ROBERT JEFFERSON,

appeared and gave the following statement:

MR. JEFFERSON: My background has to do with the transportation of radioactive materials. I, for a number of years, headed up the program on transportation safety at Sandia National Labs in Albuquerque.

I'd like to point out a few things. First of all, transporting spent fuel is not some up-and-coming industry that's never been accomplished before, but has, in fact, been accomplished for the past 30 years; not only in this country, but throughout the world.

The regulations that govern the design and operation of the equipment that's used for this are uniform worldwide, and I participated in establishing those regulations.

So the history that we have to draw on for the transport of these materials is not only established in this country, but in other countries throughout the world.

1... And in the past 30 years in this country there have been almost 3,000 shipments. Worldwide

(1)

1 cont.

they have been something on the order of 12,000 shipments.

In that experience there have been accidents. There have been accidents transporting other radioactive materials other than spent fuel. But in no case where those materials were transported in the type of equipment that will be used for transporting spent fuel to Yucca Mountain has there ever been an accident that even came close to challenging the integrity of the containers that will be used, or the casks.

In the mid-70s at Sandia, the organization that I headed up, conducted a series of full-scale tests using the equipment that had been retired from service under controlled conditions, to evaluate not so much the container's ability to survive the accident, but to evaluate our capability to predict the damage that would occur in accident situations.

So what we did was we thoroughly analyzed each accident before it took place, published our results, invited people to watch the tests, and for the first test in the series we had 900 people show up.

And as an aside, it created some

interesting situations, including a state policeman from the state of Idaho who was on duty. It was his duty to come there, and the State of Idaho requires him, when on duty, to carry a sidearm.

Only this test was conducted in a security area, and the federal regulations say you can't take a sidearm into a security area. So it took a while to get that straightened out, and that delayed the first test several hours.

But nonetheless, these tests were conducted in the broadest possible public scrutiny. And in every case, the results that had been predicted were slightly worse than the results expected.

But the important thing was that we had in hand the tools, the technical tools, to evaluate these accidents and other accidents. And so, on that basis, we have continually over the years improved our ability at predicting the results of insults against these very, very large, heavy, rigid shipping containers.

It was on that basis that the Nuclear Regulatory Commission and the DOE conducted a number of studies on what might happen. And the result of these is incorporated into the EIS.

Many of the terms there are terms that are familiar and have been in place now since the early '80s, and, in fact, point out that the insults that you would expect to these containers during transportations very rarely, if ever, challenge the integrity of the container.

2... The EIS uses six accident severity categories. The first category contains 99 percent of all the accidents. And understand that there are, I think, 40 accidents predicted in the EIS, and that's simply a mileage basis thing.

But you've got to understand that that mileage is both ways. So more than likely half of those accidents would involve a container that has nothing in it. So it doesn't make any difference how severe the accident is, it's still going to release nothing.

So that leaves us with about 20 accidents that are involving these materials. And of those, 99 percent, or about 19.8 of those accidents, would be within the first category, accident category, severity category, which is the limits, the boundaries, set by the Nuclear Regulatory Commission on designing these containers. So there would be no impacts

2 cont.

whatsoever.

The remaining five impact severities, four of that five would also be survivable by the containers. If you used the current tools to analyze the container under those insults, the container would still survive.

The sixth category only is the one that the container might be challenged. And we don't know that it will, but it would certainly be a possibility. If you take 99 percent, or 1 in 100 of category one, then categories two through five would reduce the probability by another factor of 100, and category six reduces it by another factor of 1,000.

And so the likelihood of an accident occurring which would even challenge the cask is somewhere on the order of 1 in 1 million. And so the likelihood, or probability, however you want to state it, of an accident occurring which would cause a release of materials from a cask, is essentially zero. If the State of Nevada Gaming Commission allowed games with that probability of payoff, nobody would bet.

Now, the shipments themselves are highly regulated by the Nuclear Regulatory Commission, but

4

4 continued on page 6

4 continued

in addition, they are tracked. That is to say, these shipments would have on them a transmitter working in what's called a Transcom system which transmits the location of that shipment at all times.

And that material, that information, is collected at a tracking unit in Washington. It's also available to all of the states. They can track a shipment as well.

Basically, there are a number of requirements, one of which is you have to notify the state in advance that you're going to enter their state. You have to do it a week in advance, then you have to do it several hours in advance, and those states can then simply plug into this system and read out where the thing is and know exactly where it is at all times.

But the important thing is that that means it's a more difficult shipment to interdict by someone who has some malevolent intent in mind.

And so we've looked at what kinds of things could someone do to one of these shipments if they were intent on causing damage. Not just the accident, but some intentional act on the part of saboteurs.

Again, the organization I had at Sandia in the early '80s conducted tests on scale models and on full-scale casks. Battelle Institute in Ohio conducted scale tests as well, and the results of all of these programs agreed quite closely.

And the result is that if you were to use some sort of munition, generally thought of as a military munition, to attack one of these casks, you can, in fact, poke a hole in it.

But when you do that, the hole you put in the cask at the outside of the cask, is huge, but the hole in the inner container of the cask where the fuel is kept is relatively small. And that's the determinant of how much gets out.

In a recent study in which they took the early experimental results and applied them to modern casks, and, again, as I said, we have calculational tools to do this now as a result of the scale model and full-scale testing we've done, you apply these to the existing casks today.

It turns out that the result of an accident -- pardon me, the result of a sabotage event is still well within the kinds of environmental impacts, including impact to the public, that you would find acceptable. The latent

5 continued on page 8

cancer fatalities are somewhat less than 1 in 100, or 1/100th of one latent cancer fatality.

5 continued on page 9

The other thing that isn't factored into those kinds of considerations is the fact that these munitions are not easy to use. And two things determine the effectiveness of these munitions. They're shaped charges. They're the kind of things the Army uses as bazookas.

One of these factors is called obliquity, which means that the shaped charge has to hit the surface of the cask at 90 degrees. If it hits as little deflection as 10 degrees, then the jet is deflected off, and it doesn't penetrate.

Now, in both cases, the rail cask and the concrete cask, the sides of the cask are such that that area of the cask that you can hit and be successful in poking a hole in it is quite small.

Furthermore, these weapons, if you're going to use a launcher to fire them, it's incredible. The closer you are, the more likely you are to miss, because the flight of the projectile is very erratic when it first comes out of the launch tube. It's only at ranges of about 100 yards that the flight becomes predictable, where the person firing it can actually aim it at

something and have a fair chance of hitting it.

But at 100 yards you're trying to hit a band on a cask that's maybe four inches wide, maybe six inches wide at the most. And so the likelihood of satisfying the obliquity requirements are very, very low.

Secondly, there is a requirement for this kind of munition to be detonated at a precise distance from the surface it's trying to penetrate. In these shoulder-launch devices there is a nose cone on there that provides you with that standoff distance, and the fuse is in the nose cone. So when it touches the surface, everything goes off.

The only problem is that these have personnel barriers around them, and so that is what the nose cone is going to hit, and you have defeated the munition simply because of standoff distance.

Now, there is a possibility, if you want to entertain it, that that person intent on causing this damage could gain physical control of this unit and, in fact, set the system up so it is optimal in its capability for destroying the cask.

Understand, though, that there is a button in the truck, in the cab of the truck, so

5 continued on page 10

5 continued

that if the driver senses any sort of interdiction, he presses the button and red lights go off in all of these control centers all over, and response to the system is quite good, quite quick.

So it takes time for the saboteur to set up the conditions he wants and to detonate his device. And in the meantime, you've got all the resources that we've got coming down on him, and that does not make it a very attractive target for a saboteur.

3 Basically, as it says in the EIS, and I agree with it here, risks from transporting these materials are extremely low. The dominant impact on the public will be ordinary traffic accidents, and not radiological accidents.

As a result of that, as a result of the fact that the radiological consequences of transporting these materials is so incredibly low, it does not make a whole lot of difference at this point in time when or where the decisions are made about how to move these materials. It's all been done before, it's all been done safely, and it's all been done with little or no impact to the public.

If there are any questions, I'd be glad

to entertain those.

HEARING OFFICER: Thanks very much. The next speaker who has signed up is Mary Ellen Giampaoli. Good morning.

(11)